RECEIVED
CENTRAL FAX CENTER

NOV 30 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of
Charles N. Archie

Serial No.: 09/902,374

Group Art Unit: 2881

Filed: July 10, 2001

Examiner: Johnston, Phillip A.

Certificate of Transmission by Facsimile

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office (Fax No. 571-273-8300) on November 30, 2005.

Mohammad S. Rahman

For: METHODOLOGY FOR CRITICAL DIMENSION METROLOGY USING STEPPER FOCUS MONITOR INFORMATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANT'S APPEAL BRIEF

Sirs:

Appellant respectfully appeals the final rejection of claims 1-26, in the Office Action dated July 26, 2005. A Notice of Appeal and Pre-Appeal Brief Request for Review was timely filed on October 6, 2005.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corp., Armonk, New York, assignee of 100% interest of the above-referenced patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to the Appellant, Appellant's legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-26, all the claims presently pending in the application and set forth fully in the attached claims appendix (Section VIII), are under appeal. Claims 1-26 were originally filed in the application. A non-final Office Action was issued on June 3, 2004 rejecting claims 1-26. The Appellant filed an Amendent under 37 C.F.R. §1.111 on July 28, 2004 amending claims 1-26. A final Office Action was issued on November 2, 2004 rejecting claims 1-26. A telephone interview occurred between the Examiner and the Appellant's legal representative on December 6, 2004 were claims 1, 8, 10, 12, 19, and 20 were discussed. Agreement was reached in the telephone interview that amending the claims to better specify "the method of producing the optimum CD value" over the prior art methods would help advance the application toward allowance. The Appellant filed an Amendent under 37 C.F.R. §1.116 on December 17, 2004 amending claims 1, 3, 5, 6, 8, 10, 12, 16, 19, 20, 22, 24, and 25, based in part, on the agreement reached in the telephone interview on December 6, 2004. Nonetheless, an Advisory Action was issued on January 25, 2005 indicating that the Amendent filed under 37 C.F.R. §1.116 on

December 17, 2004 would not be entered. The Appellant filed a Request for Continued Examination (RCE) on January 28, 2005 to force entry of the Amendent filed under 37 C.F.R. §1.116 on December 17, 2004. A non-final Office Action was issued on April 5, 2005 rejecting claims 1-26. The Appellant filed an Amendent under 37 C.F.R. §1.111 on May 27, 2005 amending claims 1, 8, 10, 12, 19, and 20. A final Office Action was issued on July 26, 2005 rejecting claims 1-26. The Appellant filed a Notice of Appeal and Pre-Appeal Brief Request for Review was timely filed on October 6, 2005. A Notice of Panel Decision from Pre-Appeal Brief Review was issued on November 23, 2005 reaffirming the rejection of claims 1-26 and recommending that the application proceed to the Board of Appeals and Interferences.

Accordingly, claims 1-26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Su (U.S. Patent No. 6,388,253), in view of Tanaka et al. (U.S. Patent No. 6,616,759) hereinafter referred to as "Tanaka".

IV. STATUS OF AMENDMENTS

A final Office Action was issued on July 26, 2005 stating that all the pending claims 1-26 were rejected. No after-final amendments were filed subsequent to the final Office Action of July 26, 2005. The claims shown in the claims appendix (Section VIII) are shown in their amended form as of the May 27, 2005 Amendment.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The Appellant's claimed invention provides method of producing an optimum critical dimension value as generally described on pages 7-15 of the specification and generally shown in Figures 7-11. With respect to claims 1 and 20, a method of producing an optimum critical

dimension value comprises acquiring a waveform of data for a critical dimension structure (FIG. 7, step 140; page 10, lines 16-17 of the specification); determining a stepper focus parameter for said critical dimension structure (FIG. 7, step 120; page 10, lines 14-15 of the specification); calculating an approximate critical dimension measurement for said critical dimension structure (FIG. 7, step 145; page 10, lines 17-18 of the specification); calibrating said data of said waveform by determining at least three best fit data parameters for improving a linearity of said waveform (page 12, lines 1-20 of the specification); combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters (FIG. 7, step 150; page 10, lines 18-19; page 12, lines 16-20 of the specification), wherein said combining removes structural bias parameters from said approximate critical dimension measurement (page 9, lines 12-14; page 11, lines 18-20 of the specification); and generating said optimum critical dimension value from said combining (page 10, lines 18-19; page 12, lines 16-20 of the specification), wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure (page 10, line 21 through page 11, line 4 of the specification).

With respect to claims 2, 13, and 21, wherein said determining comprises navigating to a stepper focus monitor target (FIG. 7, step 100; page 10, lines 11-12 of the specification); performing a scanning electron microscope focusing (FIG. 7, step 105; page 10, line 12 of the specification); and performing a final alignment of said target (FIG. 7, step 110; page 10, line 13 of the specification).

With respect to claims 3, 14, and 22, wherein said determining further comprises acquiring the waveform data (FIG. 7, step 115; page 10, lines 13-14 of the specification); analyzing said waveform data (page 10, line 14 of the specification); and determining said

stepper focus parameter based on said analyzing (FIG. 7, step 120; page 10, lines 14-15 of the specification).

With respect to claims 4, 15, and 23, wherein said determining further comprises acquiring an image data (FIG. 7, step 115; page 10, lines 13-14 of the specification); analyzing said image data (page 10, line 14 of the specification); and determining said stepper focus parameter based on said analyzing (FIG. 7, step 120; page 10, lines 14-15 of the specification).

With respect to claims 5, 16, and 24, wherein said generating comprises navigating to said critical dimension structure (FIG. 8, step 125; page 11, lines 7-8 of the specification); performing a scanning electron microscope focusing (FIG. 8, step 130; page 11, lines 8-9 of the specification); and performing a final alignment of said critical dimension structure (FIG. 8, step 135; page 11, line 9 of the specification).

With respect to claims 6, 17, and 25, wherein said generating further comprises acquiring the waveform data (FIG. 8, step 140, line 9 of the specification); analyzing said waveform data (page 11, lines 9-12 of the specification); and determining said optimum critical dimension value based on said analyzing (FIG. 8, step 150; page 11, lines 11-13 of the specification).

With respect to claims 7, 18, and 26, wherein said generating further comprises acquiring an image data (FIG. 7, step 115; page 10, lines 13-14 of the specification); analyzing said image data (page 10, line 14 of the specification); and determining said optimum critical dimension value based on said analyzing (FIG. 7, step 120; page 10, lines 14-15 of the specification).

With respect to claim 8, a method of producing an optimum critical dimension value comprises generating a scanning electron microscope focus (FIG. 8, step 130; page 11, lines 8-9 of the specification); generating a waveform data based on output from said scanning electron microscope focus (FIG. 8, step 140; page 11, line 9 of the specification); analyzing said

waveform data to determine an approximate critical dimension measurement (FIG. 8, step 145; page 11, lines 9-10 of the specification); calibrating said waveform data by determining at least three best fit data parameters for improving a linearity of said waveform data (page 12, lines 1-20 of the specification); analyzing said waveform data to determine a stepper focus parameter (FIG. 8, step 120; page 11, lines 11-12 of the specification); combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters (FIG. 8, step 150; page 11, lines 12-13; page 12, lines 16-20 of the specification), wherein said combining removes structural bias from said approximate critical dimension measurement (page 9, lines 12-14; page 11, lines 18-20 of the specification); and generating said optimum critical dimension value from said combining (page 11, lines 12-13; page 12, lines 16-20 of the specification), wherein said optimum critical dimension value comprises structural measurements of a critical dimension structure that are only relevant to a critical dimension of said critical dimension structure (page 10, line 21 through page 11, line 4 of the specification).

With respect to claim 9, wherein said generating a waveform data further comprises navigating to a critical dimension structure (FIG. 7, step 125; page 10, line 15 of the specification); performing a scanning electron microscope focusing (FIG. 7, step 130; page 10, lines 15-16 of the specification); performing a final alignment of said critical dimension structure (FIG. 7, step 135; page 10, line 16 of the specification); and acquiring said waveform data based on said scanning electron microscope focusing and said final alignment (FIG. 7, step 140; page 10, lines 16-17 of the specification).

With respect to claim 10, a method of producing an optimum critical dimension value comprises generating a scanning electron microscope focus (FIG. 8, step 130; page 11, lines 8-9 of the specification); generating an image data (page 10, line 13 of the specification) based on

output from said scanning electron microscope focus (FIG. 8, step 140; page 11, line 9 of the specification); analyzing said image data to determine an approximate critical dimension measurement (FIG. 8, step 145; page 11, lines 9-10 of the specification); calibrating said image data by determining at least three best fit data parameters for improving a linearity of said image data (page 12, lines 1-20 of the specification); analyzing said image data to determine a stepper focus parameter (FIG. 8, step 120; page 11, lines 11-12 of the specification); combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters (FIG. 8, step 150; page 11, lines 12-13; page 12, lines 16-20 of the specification), wherein said combining removes structural bias from said approximate critical dimension measurement (page 9, lines 12-14; page 11, lines 18-20 of the specification); and generating said optimum critical dimension value from said combining (page 11, lines 12-13; page 12, lines 16-20 of the specification), wherein said optimum critical dimension value comprises structural measurements of a critical dimension structure that are only relevant to a critical dimension of said critical dimension structure (page 10, line 21 through page 11, line 4 of the specification).

With respect to claim 11, wherein said generating an image data (page 10, line 13 of the specification) further comprises navigating to a critical dimension structure (FIG. 7, step 125; page 10, line 15 of the specification); performing a scanning electron microscope focusing (FIG. 7, step 130; page 10, lines 15-16 of the specification); performing a final alignment of said critical dimension structure (FIG. 7, step 135; page 10, line 16 of the specification); and acquiring said image data based on said scanning electron microscope focusing and said final alignment (FIG. 7, step 140; page 10, lines 16-17 of the specification).

With respect to claim 12, a method of producing an optimum critical dimension value

comprises acquiring data representative of a critical dimension structure (FIG. 7, step 115; page 10, lines 13-14 of the specification); determining a stepper focus parameter for said critical dimension structure (FIG. 7, step 120; page 10, lines 14-15 of the specification); measuring an approximate critical dimension measurement for said critical dimension structure (FIG. 7, step 145; page 10, lines 17-18 of the specification); calibrating said data by determining at least three best fit data parameters for improving a linearity of said data (page 12, lines 1-20 of the specification); combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters (FIG. 7, step 150; page 10, lines 18-19; page 12, lines 16-20 of the specification), wherein said combining removes structural bias parameters from said approximate critical dimension measurement (page 9, lines 12-14; page 11, lines 18-20 of the specification); and generating said optimum critical dimension value based on said combining (page 10, lines 18-19; page 12, lines 16-20 of the specification), wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure (page 10, line 21 through page 11, line 4 of the specification).

With respect to claim 19, a method of producing an optimum critical dimension value comprises acquiring data representative of a critical dimension structure (FIG. 7, step 115; page 10, lines 13-14 of the specification); determining a stepper focus parameter for said critical dimension structure (FIG. 7, step 120; page 10, lines 14-15 of the specification); measuring an approximate critical dimension measurement for said critical dimension structure (FIG. 7, step 145; page 10, lines 17-18 of the specification); calibrating said data by determining at least three best fit data parameters for improving a linearity of said data (page 12, lines 1-20 of the specification); combining said stepper focus parameter with said approximate critical dimension

measurement and said best fit data parameters (FIG. 7, step 150; page 10, lines 18-19; page 12, lines 16-20 of the specification), wherein said combining removes structural bias parameters from said approximate critical dimension measurement (page 9, lines 12-14; page 11, lines 18-20 of the specification); and generating said optimum critical dimension value based on said combining (page 10, lines 18-19; page 12, lines 16-20 of the specification), wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure (page 10, line 21 through page 11, line 4 of the specification); wherein said determining further comprises navigating to a stepper focus monitor target (FIG. 7, step 100; page 10, lines 11-12 of the specification); performing a scanning electron microscope focusing at said target (FIG. 7, step 105; page 10, line 12 of the specification); performing a final alignment of said target based on said scanning electron microscope focusing at said target (FIG. 7, step 110; page 10, line 13 of the specification); acquiring a first data set from said scanning electron microscope focusing (FIG. 7, step 115; page 10, lines 14-15 of the specification); analyzing said first data set (page 10, line 14 of the specification); and determining said stepper focus parameter based on said analyzing (FIG. 7, step 120; page 10, lines 14-15 of the specification); wherein said generating further comprises navigating to said critical dimension structure (FIG. 7, step 125; page 10, line 15 of the specification); performing a scanning electron microscope focusing at said critical dimension structure (FIG. 7, step 130, lines 15-16 of the specification); performing a final alignment of said critical dimension structure (FIG. 7, step 135; page 10, line 16 of the specification); acquiring a second data set from said scanning electron microscope focusing at said critical dimension structure (FIG. 7, step 140; page 10, lines 16-17 of the specification); analyzing said second data set (page 10, line 17 of the specification); and determining said

optimum critical dimension value based on said analyzing (FIG. 7, step 150; page 10, line 19 of the specification).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for review by the Board of Patents Appeals and Interferences are whether claims 1-26 are unpatentable under 35 U.S.C. §103(a) as being unpatentable over Su in view of Tanaka.

VII. ARGUMENT

A. The Prior Art References

1. The Su Reference

Su teaches a method and apparatus for reducing lot to lot CD variation in semiconductor wafer processing feeds back information gathered during inspection of a wafer, such as after photoresist application, exposure and development, to upcoming lots that will be going through the photolithography process, and feeds forward information to adjust the next process the inspected wafer will undergo (e.g., the etch process). Su further teaches forming a feature such as an etch mask on a semiconductor wafer at a "photo cell" by a photolithography process, then conventionally imaging the feature with a CD-SEM to measure its CD and other sensitive parameters. The measured parameters are linked, via the feature's SEM waveform, to photolithography adjustable parameters such as stepper focus and exposure settings. If the measured parameters deviate from design dimensions, the linked information on focus and exposure is fed back to the photo cell so the stepper can be adjusted, either automatically or at the user's discretion, to correct the deviation in following lots. The measured parameters are also

linked to etch process adjustable parameters such as etch recipes for different over-etch and/or etch chemistry. If the measured parameters deviate from desired values, a linked etch recipe to correct the error is fed forward to the etcher and implemented automatically or at the user's discretion. This feedback and feed-forward mechanism improves lot to lot CD control at inspection following photoresist development and at final inspection as well.

2. The Tanaka Reference

Tanaka discloses a method and system are provided for controlling and/or monitoring a semiconductor processing apparatus while predicting its processing results. The system includes a sensor for monitoring a processing state of the processing apparatus, a sensed data storage unit for preserving sensed data sent from the sensor, an input device for inputting measured values for processing results of semiconductor devices processed by the processing apparatus, a processing result measured value storage unit for preserving the inputted processing result measured values, a model equation generation unit for generating a model equation from preserved sensed data and processing result measured values, a model equation storage unit for preserving the generated model equation, a model equation based prediction unit for predicting processing results from the preserved model equation and the sensed data, and a process recipe control unit for controlling processing conditions of the processing apparatus from predicted processing results.

B. The Position in the Office Action

The Office Action indicates that Su discloses:

(a) Obtaining a focus exposure matrix of critical dimension (CD) waveforms and images

as a function of stepper focus parameters, as recited in claim 1, 3-4, 6-11, 14-15, 17-19, 21, 23, and 25-26. See Column 4, line 57-67; Column 5, line 1-24; and Figures 1A and 6B;

(b) Generating a library of reference features (approximate CD values) from the analysis of the matrix waveform data, as recited in claims 1-4, 6-8, 10, 12-15, 17-23, and 25-26. See Column 4, line 12-45; and Column 5, line 6-57;

(c) Performing an analysis of the data to generate a "golden waveform", as recited in claims 2-4, 6-8, 10, 12-15, 17-23, and 25-26. See Column 5, line 48-67; and Column 6, line 1-4;

(d) Comparing the target waveform to the "golden waveform" or one of the library of reference waveforms by using an algorithm to "fit a curve" as in Figure 6B above, thereby obtaining the best "matching score" or correlation (best fit), as recited in claims 1, 8, 10,12, and 19-20. See Column 10, line 26-42;

(e) Selecting a target feature, as recited in claims 2, 13, 19, and 21. See Column 6, line 5-21;

(f) Using plural parameters (at least three) to obtain a feature waveform including; CD as measured with a CD-SEM and/or AFM, as well as other sensitive parameters such as edge width and profile grade. The measured parameters are linked to photolithography adjustable parameters such as stepper focus and exposure settings, as recited in claims 1, 8, 10, 12, and 19-20. See Column 3, line 52-67; and Column 5, line 20-39.

According to the Office Action, Su as applied above fails to teach a method of calibrating the waveform data by determining at least three best-fit data parameters, and combining the best-fit data parameters with a stepper focus parameter and a critical dimension measurement to improve the linearity of the critical dimension waveform, as recited in claims 1, 8, 10, 12, and 19-20.

However, according to the Office Action, Tanaka discloses a method of monitoring semiconductor manufacturing that includes the generation of a model equation from three parameters of sensed data, and using the best fit of the three parameters via multiple regressions to improve linearity of the data. See Column 3, line 57-67; Column 5, line 5-37, and Figure 6 below.

The Office Action states that it is implied herein that removing faulty process shapes in accordance with Tanaka is equivalent to improving linearity, as recited in claims 1, 8, 10, 12, and 19-20.

The Office Action concludes that it would have been obvious to one of ordinary skill in the art that the critical dimension apparatus and method of Su can be modified to use the model equation and regression method of Tanaka, to provide a robust regression method, to correct a prediction model equation by removing faulty process shape data, thereby controlling and/or monitoring a semiconductor processing apparatus while predicting its processing results.

C. Appellant's Position

1. Independent Claims 1, 8, 10, 12, and 19-20

Su in view of Tanaka fails to disclose, teach, or suggest the features of independent claims 1, 8, 10, 12, 19, and 20. Specifically, claims 1 and 8 generally provide, in part, "...calibrating said image data by determining at least three best fit data parameters for improving a linearity of said image data... wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure." Similarly, claim 10 generally provides, in part, "calibrating said image data by determining at least three best fit data parameters for

improving a linearity of said image data ... wherein said optimum critical dimension value comprises structural measurements of a critical dimension structure that are only relevant to a critical dimension of said critical dimension structure." Likewise, claims 12, 19, and 20 generally provide, in part, "...calibrating said data by determining at least three best fit data parameters for improving a linearity of said data... wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure." Generally, the Appellant's invention teaches a method to improve and optimize the accuracy of the CD-SEM measurement that relies on either additional information in the waveform or other information coming from another distinct CD-SEM measurement or from another distinct non-CD-SEM measurement.

Conversely, Su assumes that the basic CD-SEM CD measurement is adequate for process control and thus forms the basis for process control. As such, Su does not seek to improve or optimize the CD value, which is contrary to the Appellant's invention. Su tends to focus on how to directly determine stepper focus and dose conditions by directly comparing target waveform to reference waveforms. As such, Su does not explicitly teach how to use additional waveform information to obtain a more accurate CD measurement. Tanaka discloses a technique for controlling and/or monitoring a semiconductor processing apparatus while predicting its processing results, and thus even if combined with Su, would still fail to teach all of the elements of the Appellant's claimed invention.

The Office Action (page 4) admits that Su fails to teach all of these elements, but nonetheless concludes that Su when combined with Tanaka teaches all of these elements. However, a closer reading of Tanaka reveals that Tanaka does not teach what the Office Action purports it teaches, and thus even if it were combined with Su, the prima facie case for rejecting

the Appellant's application is deficient and improper. In fact, Tanaka does not remove "structural bias parameters" from an approximate critical dimension measurement. The Office Action (page 5) indicates that Tanaka uses a best fit analysis in order to improve the linearity of the data.

However, the Office Action assumes that Tanaka's removal of faulty process shapes is patentably analogous to Appellant's improved linearity. In fact, such a conclusion is erroneous. Rather, col. 2, lines 31-37 of Tanaka provide that Tanaka's technique monitors the processing state of a semiconductor process/apparatus to detect faulty processing or predict the processing based on the monitored results in order to improve the process. Conversely, Appellant's invention generates an optimum critical dimension value based on the three best fit data parameters in combination with a stepper focus parameter. Accordingly, the Appellant asserts that the Examiner is improperly combining Tanaka with Su and is making assumptions (i.e., Office Action states, "It is implied herein...") regarding Tanaka in an effort to try and teach the Appellant's claimed invention. Furthermore, there would simply be no motivation to combine Su with Tanaka because one of ordinary skill in the art would not have made the assumption (i.e., see implied language on page 5 of the Office Action) that was made in the Office Action.

Appellant's claimed invention teaches combining a stepper focus parameter with an approximate critical dimension (CD) measurement and (at least three) best fit data parameters. Conversely, nowhere in Su is it taught that an optimum CD value can be generated by combining stepper focus with an approximate (i.e., less than optimum) CD value and at least three best fit parameters used to improve the linearity of the CD data. In fact, combining the stepper focus with CD data as suggested and implemented by Su will not achieve optimum CD values. This is because Su assumes that the CD value is already optimal. However, in fact, it is not optimal, as

experimental results indicate. According to column 3, lines 52-57 through column 4, lines 1-11 of Su, CD measurements are taken and are compared with design dimensions. If there is a deviation between the CD measurements and the established design dimensions, then Su corrects the deviation by adjusting the stepper dose. Thus, in Su no changes or adjustments are made to the critical dimension measurement (i.e., no improvement (optimization) is made to the critical dimension measurement). Conversely, in the Appellant's claimed invention an improvement (optimization) is made to the critical dimension measurement by combining the stepper focus parameter with the critical dimension measurement. In other words, Su changes the stepper dose parameter to reduce the deviation of measured parameters from design dimensions to achieve process control rather than combining the stepper focus parameter with the CD measurement to generate an improved CD measurement. As such, these (Appellant's invention compared with Su) are two fundamentally distinct inventions.

Pages 2-4 of the Office Action state that Su discloses "obtaining a focus exposure matrix..." and "performing an analysis of the data to generate a 'golden waveform'." However, the Appellant's claimed invention claims no such features. Thus, the Office Action erroneously reads these features into the Appellant's claimed invention; therefore the rejection is improper.

Generally, Su (1) uses a reference CD value (which it assumes is optimal, when in fact it is not optimal); (2) measures a CD value; (3) compares the reference CD value to the measured CD value; and performs an etch process according to the difference in the reference CD value and the measured CD value. Conversely, the Appellant's claimed invention is basically challenging the validity of the reference CD in Su, which is taken as an optimum value. As such, the Appellant's claimed invention provides an analytical approach of optimizing the CD value by using at least three best fit parameters in combination with a stepper focus parameter to improve

the linearity of the approximate CD data (i.e., reference CD data).

There exist many other fundamental differences and patentable distinctions between the Appellant's invention and the teachings of Su as well. Specifically, Su teaches how to control a lithography manufacturing process by using SEM (scanning electron microscope) waveform information and SEM CD (critical dimension) measurement to provide feedback and feedforward to dynamically tune lithography and etch processes. Conversely, the Appellant's claimed invention provides how to make a significantly more accurate CD measurement by correcting the initial (old) CD measurement by using lithography-defocus-sensitive information either from the CD or from some other source and combining this with the best fit data parameters in an analytical as discussed above. Additionally, what distinguishes the Appellant's claimed invention from the Su is the understanding that CD measurements inherent in Su are essentially corrupted due to consideration of structural characteristics, which are not relevant to the critical dimension, but which are highly sensitive to the stepper focus, such as sidewall angle, edge width, and profile grade (as clearly indicated in column 3, line 60 of Su).

Common to the patent of Su and the Appellant's claimed invention/specification is a body of work referenced in both, which teach that the printed feature has profile properties that can be sensitive to both lithography tool dose and focus settings. In some cases of the prior art, specialized targets are described that are particularly sensitive to defocus; i.e., measurements by optical or electron beam based tools provide defocus determination with much smaller uncertainty than what can be determined by using the waveform and CD from SEM measurement at a critical control feature. The work of Davidson et al. and Villarrubia et al. (referred to the Appellant's specification, page 7, lines 4-12) study the possibility of extracting printed structure profile information from the full SEM waveform. As Archie et al. (U.S. Patent

5,969,273) have taught, the sidewall information from the SEM waveform is a sensitive indicator of lithography tool defocus.

Su uses this prior art to teach a possible method for extracting stepper focus and dose information, as well as sidewall information, from the SEM waveform for the purpose of providing corrective actions in manufacturing processes. However, and most significantly, Su does not teach how to improve (optimize) upon the critical dimension measurement itself as does the Appellant's claimed invention.

Achieving a more accurate CD measurement is an important application of the CD-SEM that is outside of the manufacturing control application. In particular, there are three main uses for the CD-SEM: (1) Process development, including lithography process development; (2) Manufacturing process control; and (3) Diagnostic measurements for an Out Of Control (OOC) manufacturing process.

Su clearly addresses only the second application (2) above. In that application where many manufacturing processes have been previously optimized and fixed, the dominant process variables that vary under normal circumstances act like stepper dose and focus variations. Only under these conditions is the process control method taught by Su a possible control strategy. Conversely, the Appellant's claimed invention addresses the other two applications (1 and 3 above) for the CD-SEM as well as providing a more accurate CD measurement for dispositioning of a product.

During process development many more process and design parameters can vary and highly accurate CD measurements are needed to understand the issues. This situation continues to worsen as lithography and etch processes evolve to produce ever smaller features. One example that has gained importance in recent years is the need to make accurate CD

measurements of a variety of structure geometries at a variety of design sizes in order to develop accurate simulation models of the full lithography process. With an accurate simulation model, the chip design data can be modified (optical proximity corrections, sub-resolution assist features, phase shifting technology for the mask, etc.) to improve upon the printing fidelity (printed image versus pre-OPC (optical proximity correction) design data).

To make accurate critical dimension measurements to feed into the simulation model optimization or verification, the measurements must not be corrupted by secondary characteristic changes in the critical shape being measured. Particularly, profile changes caused by lithography focus-like variations should not be allowed to alter the base CD measurement. As such, the Appellant's claimed invention removes the profile-change-induced-errors in the measurement thereby revealing the design-induced-changes needed for simulation optimization or verification. This is accomplished by combining the stepper focus with a critical dimension measurement, which generates an optimum critical dimension. This use of the CD-SEM continues to grow as the industry starts to move away from CD-SEM as the principal tool for manufacturing control (application 2) toward scatterometry as the preferred metrology system for control.

The Office Action contends that Su and Tanaka teach all of the elements of how to make a more accurate CD measurement. However, since Su's purpose is solely to teach process control and more precisely, a method to obtain more control of the final etch CD, Su does not describe how to make a more accurate CD measurement. Furthermore, Su teaches how to obtain a set of reference data by constructing reference data (CD, waveforms, and other data (see Figure 2B of Su) from specially constructed Focus-Exposure-Matrix wafers (see Figure 1 of Su). However, attempting to match a target waveform to one of the reference waveforms and then reporting a CD result based on that match would provide too coarse a CD measurement, thereby

teaching away from the Appellant's invention's method of producing an optimum CD value. Experimental testing as conducted by the Appellant, with the results provided and described in Appellant's Figures 2, 9, and 10 and associated text in the specification indicate that there are many problems with this type of prior art approach including the impracticality of constructing a large enough FEM wafer to reduce the coarseness and the issue how to exactly distinguish between similar reference waveforms. Similarly, Tanaka says nothing regarding combining three best fit parameters with a stepper focus parameter in order to generate an optimum critical dimension value.

Furthermore, the Appellant's specification further teaches that SEM resolution is a critical issue today and will only get worse in the future. Moreover, many details of the feature affect the critical portions of the waveform (see Figures 6A-6C of Su) including the bottom CD and many elements of the sidewall profile. Waveforms can differ because of changes in many of the feature properties but Su fails to teach how to weigh this information to extract the CD free of the secondary characteristics of the profile.

As such, the Appellant's claimed invention relies on the sophisticated CD methodologies already available on commercial CD-SEMs. These methodologies have been developed to overcome noise limitations in the waveform as well as to seek the bottom edge signature in the waveform. The Appellant's invention's approach is to provide a correction to that determination based on additional information possibly coming from analyzing the waveform in another way to gain stepper focus like information or if necessary using information from a separate measurement. As such, the Appellant's claimed invention's approach does not suffer from either the coarseness problem or the resolution-limiting-convolution of multiple feature signatures in the waveform.

Insofar as references may be combined to teach a particular invention, and the proposed combination of Su and Tanaka with one another, case law establishes that, before any prior-art references may be validly combined for use in a prior-art 35 U.S.C. § 103(a) rejection, the individual references themselves or corresponding prior art must suggest that they be combined.

For example, in In re Sernaker, 217 U.S.P.Q. 1, 6 (C.A.F.C. 1983), the court stated: "[P]rior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantage to be derived from combining their teachings." Furthermore, the court in Uniroyal, Inc. v. Rudkin-Wiley Corp., 5 U.S.P.Q.2d 1434 (C.A.F.C. 1988), stated, "[w]here prior-art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. . . . Something in the prior art must suggest the desirability and thus the obviousness of making the combination."

In the present application, the reason given to support the proposed combination is improper, and is not sufficient to selectively and gratuitously substitute parts of one reference for a part of another reference in order to try to meet, but failing nonetheless, the Appellant's novel claimed invention. Moreover, there is nothing in the prior art references themselves, namely Su and Tanaka, which suggests a motivation to combine elements from each reference in a manner consistent with the suggestion by the Office Action. Furthermore, the Appellant's invention meets the above-cited tests for obviousness by including embodiments such as "calibrating said image data by determining at least three best fit data parameters for improving a linearity of said image data... wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure." As such, all of the claims of this application are, therefore, clearly in

condition for allowance, and it is respectfully requested that the Board pass these claims to allowance and issue.

As declared by the Federal Circuit:

> In proceedings before the U.S. Patent and Trademark Office, the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art. The Examiner can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fritch, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992) citing In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

Here, the Examiner has not met the burden of establishing a prima facie case of obviousness. It is clear that, not only does Su fail to disclose all of the elements of the claims of the Appellant's invention, but also, if combined with Tanaka, fails to disclose these elements as well. The unique elements of the Appellant's invention are clearly an advance over the prior art.

The Federal Circuit also went on to state:

> The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. . . . Here the Examiner relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. Fritch at 1784-85, citing In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Here, there is no suggestion that Su, alone or in combination with Tanaka teaches a method containing all of the limitations of the Appellant's invention. Consequently, there is absent the "suggestion" or "objective teaching" that would have to be made before there could be established the legally requisite "prima facie case of obviousness." Therefore, independent claims 1, 8, 10, 12, 19, and 20 are patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 1, 8, 10,

12, 19, and 20 and pass these claims to issue.

2. Dependent claims 2-7, 9, 11, 13-18, and 21-26

Appellant's claimed invention teaches combining a stepper focus parameter with an approximate critical dimension (CD) measurement and (at least three) best fit data parameters. Conversely, nowhere in Su is it taught that an optimum CD value can be generated by combining stepper focus with an approximate (i.e., less than optimum) CD value and at least three best fit parameters used to improve the linearity of the CD data. In fact, combining the stepper focus with CD data as suggested and implemented by Su will not achieve optimum CD values. This is because Su assumes that the CD value is already optimal. However, in fact, it is not optimal, as experimental results indicate. According to column 3, lines 52-57 through column 4, lines 1-11 of Su, CD measurements are taken and are compared with design dimensions. If there is a deviation between the CD measurements and the established design dimensions, then Su corrects the deviation by adjusting the stepper dose. Thus, in Su no changes or adjustments are made to the critical dimension measurement (i.e., no improvement (optimization) is made to the critical dimension measurement). Conversely, in the Appellant's claimed invention an improvement (optimization) is made to the critical dimension measurement by combining the stepper focus parameter with the critical dimension measurement. In other words, Su changes the stepper dose parameter to reduce the deviation of measured parameters from design dimensions to achieve process control rather than combining the stepper focus parameter with the CD measurement to generate an improved CD measurement. As such, these (Appellant's invention compared with Su) are two fundamentally distinct inventions.

The Office Action contends that Su and Tanaka teach all of the elements of how to make

a more accurate CD measurement. However, since Su's purpose is solely to teach process control and more precisely, a method to obtain more control of the final etch CD, Su does not describe how to make a more accurate CD measurement. Furthermore, Su teaches how to obtain a set of reference data by constructing reference data (CD, waveforms, and other data (see Figure 2B of Su) from specially constructed Focus-Exposure-Matrix wafers (see Figure 1 of Su). However, attempting to match a target waveform to one of the reference waveforms and then reporting a CD result based on that match would provide too coarse a CD measurement, thereby teaching away from the Appellant's claimed invention's method of producing an optimum CD value. Experimental testing as conducted by the Appellant, with the results provided and described in Appellant's Figures 2, 9, and 10 and associated text in the specification indicate that there are many problems with this type of prior art approach including the impracticality of constructing a large enough FEM wafer to reduce the coarseness and the issue how to exactly distinguish between similar reference waveforms. Similarly, Tanaka says nothing regarding combining three best fit parameters with a stepper focus parameter in order to generate an optimum critical dimension value.

As explained in greater detail above (Section VII.C(1)), Su in combination with Tanaka fails to teach optimization to the critical dimension measurement much less the features provided in dependent claims 2-7, 9, 11, 13-18, and 21-26. Thus, the Appellant respectfully submits that dependent claims 2-7, 9, 11, 13-18, and 21-26 are similarly patentable, not only because they depend from patentable independent claims, but also because of the additional features of the Appellant's invention they define. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 2-7, 9, 11, 13-18, and 21-26 and pass these claims to issue.

(a) Claims 3-4, 6-7, 9, 11, 14-15, 17-18, 22-23, and 25-26

Su tends to focus on how to directly determine stepper focus and dose conditions by directly comparing target waveform to reference waveforms. As such, Su does not explicitly teach how to use additional waveform information to obtain a more accurate CD measurement. Conversely, Appellant's claims 3-4, 6-7, 9, 11, 14-15, 17-18, 22-23, and 25-26 all teach acquiring this additional waveform (or image) data. See below:

(1) Claims 3, 14, and 22

Claims 3, 14, and 22 teach wherein said determining further comprises acquiring the waveform data (FIG. 7, step 115; page 10, lines 13-14 of the specification); analyzing said waveform data (page 10, line 14 of the specification); and determining said stepper focus parameter based on said analyzing (FIG. 7, step 120; page 10, lines 14-15 of the specification). Su and Tanaka do not teach acquiring this additional waveform data. Therefore, dependent claims 3, 14, and 22 are patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 3, 14, and 22 and pass these claims to issue.

(2) Claims 4, 15, and 23

Claims 4, 15, and 23 teach wherein said determining further comprises acquiring an image data (FIG. 7, step 115; page 10, lines 13-14 of the specification); analyzing said image data (page 10, line 14 of the specification); and determining said stepper focus parameter based on said analyzing (FIG. 7, step 120; page 10, lines 14-15 of the specification). Su and Tanaka do

not teach acquiring this additional image data. Therefore, dependent claims 4, 15, and 23 are patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 4, 15, and 23 and pass these claims to issue.

(3) Claims 6, 17, and 25

Claims 6, 17, and 25 teach wherein said generating further comprises acquiring the waveform data (FIG. 8, step 140, line 9 of the specification); analyzing said waveform data (page 11, lines 9-12 of the specification); and determining said optimum critical dimension value based on said analyzing (FIG. 8, step 150; page 11, lines 11-13 of the specification). Su and Tanaka do not teach acquiring this additional waveform data. Therefore, dependent claims 6, 17, and 25 are patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 6, 17, and 25 and pass these claims to issue.

(4) Claims 7, 18, and 26

Claims 7, 18, and 26 teach wherein said generating further comprises acquiring an image data (FIG. 7, step 115; page 10, lines 13-14 of the specification); analyzing said image data (page 10, line 14 of the specification); and determining said optimum critical dimension value based on said analyzing (FIG. 7, step 120; page 10, lines 14-15 of the specification). Su and Tanaka do not teach acquiring this additional image data. Therefore, dependent claims 7, 18, and 26 are patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 7, 18, and 26 and pass these claims to

issue.

(5) Claim 9

Claim 9 teaches wherein said generating a waveform data further comprises navigating to a critical dimension structure (FIG. 7, step 125; page 10, line 15 of the specification); performing a scanning electron microscope focusing (FIG. 7, step 130; page 10, lines 15-16 of the specification); performing a final alignment of said critical dimension structure (FIG. 7, step 135; page 10, line 16 of the specification); and acquiring said waveform data based on said scanning electron microscope focusing and said final alignment (FIG. 7, step 140; page 10, lines 16-17 of the specification). Su and Tanaka do not teach acquiring this additional waveform data. Therefore, dependent claim 9 is patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claim 9 and pass these claims to issue.

(6) Claim 11

Claim 11 teaches wherein said generating an image data (page 10, line 13 of the specification) further comprises navigating to a critical dimension structure (FIG. 7, step 125; page 10, line 15 of the specification); performing a scanning electron microscope focusing (FIG. 7, step 130; page 10, lines 15-16 of the specification); performing a final alignment of said critical dimension structure (FIG. 7, step 135; page 10, line 16 of the specification); and acquiring said image data based on said scanning electron microscope focusing and said final alignment (FIG. 7, step 140; page 10, lines 16-17 of the specification). Su and Tanaka do not teach acquiring this additional image data. Therefore, dependent claim 11 is patentable over Su

in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claim 11 and pass these claims to issue.

(b) Claims 2, 5, 13, 16, 21, and 24

Furthermore, dependent claims 2, 5, 13, 16, 21, and 24 contain features, which when read in light of the corresponding independent claims, render the dependent claims patentable.

(1) Claims 2, 13, and 21

For example, claims 2, 13, and 21 teach wherein said determining comprises navigating to a stepper focus monitor target (FIG. 7, step 100; page 10, lines 11-12 of the specification); performing a scanning electron microscope focusing (FIG. 7, step 105; page 10, line 12 of the specification); and performing a final alignment of said target (FIG. 7, step 110; page 10, line 13 of the specification). Su and Tanaka do not teach these features when read in light of the corresponding independent claims. Therefore, dependent claims 2, 13, and 21 are patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 2, 13, and 21 and pass these claims to issue.

(2) Claims 5, 16, and 24

Moreover, claims 5, 16, and 24 teach wherein said generating comprises navigating to said critical dimension structure (FIG. 8, step 125; page 11, lines 7-8 of the specification); performing a scanning electron microscope focusing (FIG. 8, step 130; page 11, lines 8-9 of the specification); and performing a final alignment of said critical dimension structure (FIG. 8, step 135; page 11, line 9 of the specification). Su and Tanaka do not teach these features when read

in light of the corresponding independent claims. Therefore, dependent claims 5, 16, and 24 are patentable over Su in view of Tanaka. Therefore, in view of the foregoing, the Board is respectfully requested to withdraw the rejections to claims 5, 16, and 24 and pass these claims to issue.

D. CONCLUSION

In conclusion, the prior art references of record, either alone or in combination with one another, fail to teach all essential elements of the Appellant's claimed invention. In many instances, there appears to be an unnecessarily broad interpretation of the prior art references as indicated in the Office Action. As indicated above, regardless of how each of the prior art references are interpreted they still fail to teach the Appellant's claimed invention as the prior art references either teach away from the Appellant's claimed invention, are contrary to the Appellant's claimed invention, or all together are bereft of any teaching whatsoever of the elements provided in the Appellant's claimed invention.

Furthermore, each prior art reference cited by the Examiner is complete and functional in itself, so there is simply no motivation to use parts from or add or substitute parts to any reference to try and teach, but failing nonetheless, the Appellant's claimed invention. Moreover, because the references take mutually exclusive paths and reach different solutions to a similar problem; i.e., controlling a semiconductor manufacturing process, they essentially teach away from each other, and thus it would not be logical for one of ordinary skill in the art to combine them. However, even if the references were legally combinable, the references would not teach the Appellant's claimed invention because several claimed features are lacking in the prior art references.

In view of the foregoing, the Appellant submits that claims 1-26, all the claims presently pending in the application, are patently distinct from the prior art of record and are in condition for allowance. The Board is respectfully requested to cancel all of the rejections to the claims and to pass the application to issue. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0458.

Respectfully submitted,

Mohammad S. Rahman, Esq.
Registration No. 43,029

Date: November 30, 2005
Gibb I.P. Law Firm, LLC
2568-A Riva Road, Suite 304
Annapolis, MD, 21401
Voice: (301) 261-8625
Fax: (301) 261-8825
Customer No. 29154

VIII. CLAIMS APPENDIX

1. (Previously Presented) A method of producing an optimum critical dimension value, said method comprising:

acquiring a waveform of data for a critical dimension structure;

determining a stepper focus parameter for said critical dimension structure;

calculating an approximate critical dimension measurement for said critical dimension structure;

calibrating said data of said waveform by determining at least three best fit data parameters for improving a linearity of said waveform;

combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters, wherein said combining removes structural bias parameters from said approximate critical dimension measurement; and

generating said optimum critical dimension value from said combining, wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure.

2. (Previously Presented) The method of claim 1, wherein said determining comprises:

navigating to a stepper focus monitor target;

performing a scanning electron microscope focusing; and

performing a final alignment of said target.

3. (Previously Presented) The method of claim 2, wherein said determining further comprises:

acquiring the waveform data;

analyzing said waveform data; and

determining said stepper focus parameter based on said analyzing.

4. (Previously Presented) The method of claim 2, wherein said determining further comprises:

acquiring an image data;

analyzing said image data; and

determining said stepper focus parameter based on said analyzing.

5. (Previously Presented) The method of claim 1, wherein said generating comprises:

navigating to said critical dimension structure;

performing a scanning electron microscope focusing; and

performing a final alignment of said critical dimension structure.

6. (Previously Presented) The method of claim 5, wherein said generating further comprises:

acquiring the waveform data;

analyzing said waveform data; and

determining said optimum critical dimension value based on said analyzing.

7. (Previously Presented) The method of claim 5, wherein said generating further comprises:

acquiring an image data;

analyzing said image data; and

determining said optimum critical dimension value based on said analyzing.

8. (Previously Presented) A method of producing an optimum critical dimension value, said method comprising:

generating a scanning electron microscope focus;

generating a waveform data based on output from said scanning electron microscope focus;

analyzing said waveform data to determine an approximate critical dimension measurement;

calibrating said waveform data by determining at least three best fit data parameters for improving a linearity of said waveform data;

analyzing said waveform data to determine a stepper focus parameter;

combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters, wherein said combining removes structural bias from said approximate critical dimension measurement; and

generating said optimum critical dimension value from said combining, wherein said optimum critical dimension value comprises structural measurements of a critical dimension structure that are only relevant to a critical dimension of said critical dimension structure.

9. (Previously Presented) The method of claim 8, wherein said generating a waveform data further comprises:

navigating to a critical dimension structure;

performing a scanning electron microscope focusing;

performing a final alignment of said critical dimension structure; and

acquiring said waveform data based on said scanning electron microscope focusing and said final alignment.

10. (Previously Presented) A method of producing an optimum critical dimension value, said method comprising:

generating a scanning electron microscope focus;

generating an image data based on output from said scanning electron microscope focus;

analyzing said image data to determine an approximate critical dimension measurement;

calibrating said image data by determining at least three best fit data parameters for improving a linearity of said image data;

analyzing said image data to determine a stepper focus parameter;

combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters, wherein said combining removes structural bias from said approximate critical dimension measurement; and

generating said optimum critical dimension value from said combining, wherein said optimum critical dimension value comprises structural measurements of a critical dimension structure that are only relevant to a critical dimension of said critical dimension structure.

11. (Previously Presented) The method of claim 10, wherein said generating an image data further comprises:

navigating to a critical dimension structure;

performing a scanning electron microscope focusing;

performing a final alignment of said critical dimension structure; and

acquiring said image data based on said scanning electron microscope focusing and said final alignment.

12. (Previously Presented) A method of producing an optimum critical dimension value, said method comprising:

acquiring data representative of a critical dimension structure;

determining a stepper focus parameter for said critical dimension structure;

measuring an approximate critical dimension measurement for said critical dimension structure;

calibrating said data by determining at least three best fit data parameters for improving a linearity of said data;

combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters, wherein said combining removes structural bias parameters from said approximate critical dimension measurement; and

generating said optimum critical dimension value based on said combining, wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure.

13. (Previously Presented) The method of claim 12, wherein said determining comprises:

navigating to a stepper focus monitor target;

performing a scanning electron microscope focusing; and

performing a final alignment of said target.

14. (Previously Presented) The method of claim 13, wherein said determining further comprises:

acquiring a waveform data;

analyzing said waveform data; and

determining said stepper focus parameter based on said analyzing.

15. (Previously Presented) The method of claim 13, wherein said determining further comprises:

acquiring an image data;

analyzing said image data; and

determining said stepper focus parameter based on said analyzing.

16. (Previously Presented) The method of claim 12, wherein said generating comprises:

navigating to said critical dimension structure;

performing a scanning electron microscope focusing; and

performing a final alignment of said critical dimension structure.

17. (Previously Presented) The method of claim 16, wherein said generating further comprises:

acquiring a waveform data;

analyzing said waveform data; and

determining said optimum critical dimension value based on said analyzing.

18. (Previously Presented) The method of claim 16, wherein said generating further comprises:

acquiring an image data;

analyzing said image data; and

determining said optimum critical dimension value based on said analyzing.

19. (Previously Presented) A method of producing an optimum critical dimension value, said method comprising:

acquiring data representative of a critical dimension structure;

determining a stepper focus parameter for said critical dimension structure;

measuring an approximate critical dimension measurement for said critical dimension structure;

calibrating said data by determining at least three best fit data parameters for improving a linearity of said data;

combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters, wherein said combining removes structural bias parameters from said approximate critical dimension measurement; and

generating said optimum critical dimension value based on said combining, wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure;

wherein said determining further comprises:

navigating to a stepper focus monitor target;

performing a scanning electron microscope focusing at said target;

performing a final alignment of said target based on said scanning electron microscope focusing at said target;

acquiring a first data set from said scanning electron microscope focusing;

analyzing said first data set; and

determining said stepper focus parameter based on said analyzing;

wherein said generating further comprises:

navigating to said critical dimension structure;

performing a scanning electron microscope focusing at said critical dimension structure;

performing a final alignment of said critical dimension structure;

acquiring a second data set from said scanning electron microscope focusing at said critical dimension structure;

analyzing said second data set; and

determining said optimum critical dimension value based on said analyzing.

20. (Previously Presented) A program storage device readable by a computer, tangibly embodying a program of instructions executable by the computer to perform a method of producing an optimum critical dimension value, said method comprising:

acquiring a waveform of data for a critical dimension structure;

determining a stepper focus parameter for said critical dimension structure;

calculating an approximate critical dimension measurement for said critical dimension structure;

calibrating said data of said waveform by determining at least three best fit data parameters for improving a linearity of said waveform;

combining said stepper focus parameter with said approximate critical dimension measurement and said best fit data parameters, wherein said combining removes structural bias parameters from said approximate critical dimension measurement; and

generating said optimum critical dimension value from said combining, wherein said optimum critical dimension value comprises structural measurements of said critical dimension structure that are only relevant to a critical dimension of said critical dimension structure.

21. (Previously Presented) The program storage device of claim 20, wherein in said method said determining comprises:

navigating to a stepper focus monitor target;

performing a scanning electron microscope focusing; and

performing a final alignment of said target.

22. (Previously Presented) The program storage device of claim 21, wherein in said method said determining further comprises:

acquiring the waveform data;

analyzing said waveform data; and

determining said stepper focus parameter based on said analyzing.

23. (Previously Presented) The program storage device of claim 21, wherein in said method said determining further comprises:

acquiring an image data;

analyzing said image data; and

determining said stepper focus parameter based on said analyzing.

24. (Previously Presented) The program storage device of claim 20, wherein in said method said generating comprises:

navigating to said critical dimension structure;

performing a scanning electron microscope focusing; and

performing a final alignment of said critical dimension structure.

25. (Previously Presented) The program storage device of claim 24, wherein in said method said generating further comprises:

acquiring the waveform data;

analyzing said waveform data; and

determining said optimum critical dimension value based on said analyzing.

26. (Previously Presented) The program storage device of claim 24, wherein in said method said generating further comprises:

acquiring an image data;

analyzing said image data; and

determining said optimum critical dimension value based on said analyzing.

IX. EVIDENCE APPENDIX

There is no other evidence known to the Appellant, Appellant's legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

X. RELATED PROCEEDINGS APPENDIX

There are no other related proceedings known to the Appellant, Appellant's legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.